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THE SENIOR LECTURER PETROV’S PROPELLER EFFECT IN PROFESSOR YAKOVENKO’S INTERPRETATION

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Summary. There were proposed the elements of the possible occurrence of propeller effect theory in special moving conditions of energetic vehicles.

Key words: vehicle, propeller, effect, speed area

INTRODUCTION

The present work [Yakovenko *et al*. 2006] gives theoretical substantiations of secluded net’s space flexure possibility that was made by moving energetic vehicle. However, it is important to get generalized equation of space flexure by moving energetic vehicle and possible sequels of space flexure to look of the moving trajectory of energetic vehicle.

In accordance with linear even moving theory [Gierniet 1965, Butyenin 1971], energetic vehicle by any equal intervals of time makes same displacements equal to passed way (Fig. 1).

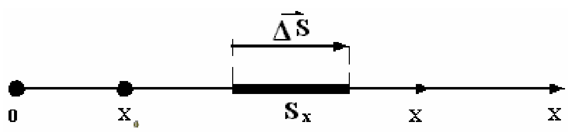

Fig. 1. The linear even moving of energetic vehicle

Projection of vector $\Delta \vec{S}$ will be

$$S_x = x(t) - x_0, \tag{1}$$

where:

x_0 and x – corresponding initial and final coordinates of vector.

The projection of vector $\vec{\upsilon}$ will be υ_x.
Vector equality

$$\Delta \vec{S} = \vec{\upsilon} \cdot t \tag{2}$$

Equal to scalar equality for vector projection $\Delta \vec{S}$:

$$S_x = \upsilon_x \cdot t \Rightarrow x(t) - x_0 = \upsilon_x \cdot t \Rightarrow x(t) = x_0 + \upsilon_x \cdot t \tag{3}$$

So, for definition of energetic vehicle situation in any period of time we will take into account beginning of moving and its speed υ [Dobronravov 1954]. Then the diagram of the way that was passed by energetic vehicle for the time t, numerically equal to space of rectangle (Fig. 2).

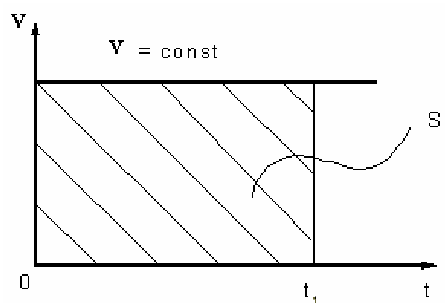

Fig. 2. The way of energetic vehicle

In accordance with the researches' conclusions [Sbir. nauk. prac 2006, Yakovenko *et. al.* 2006] and with the account Figure 2 relative way of energetic vehicle in process of space flexure in its moving has look like represented on the Figure 3.

a) b)

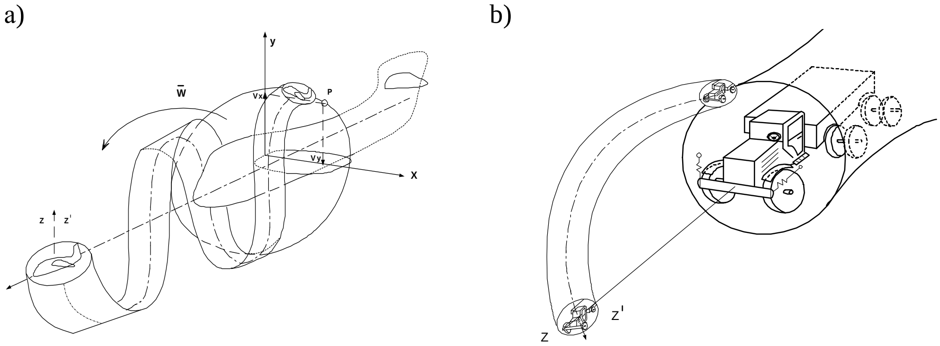

Fig. 3. The way of plane (a) and energetic vehicle (b) in process of space flexure.

THE METHODS OF INVESTIGATION

Let us consider, that to moving energetic vehicle acts gravity [Antonov 1949, Batalov 1963] and weight power (Fig. 4). In initial moment of time ($t = 0$) energetic vehicle situated on the axis Z at the distance $Z = 0$ from the beginning of counting out and initial speed υ_0 was compared to it, whose vector is directed parallel to axis Z. The forces $\vec{P}_T$, $\vec{G}$ that were applied to energetic vehicle and vector $\vec{\upsilon}_0$ of initial speed are situated on the plane $z0t$, and that is why we should look up the future moving of energetic vehicle relatively to this plane (Fig. 4).

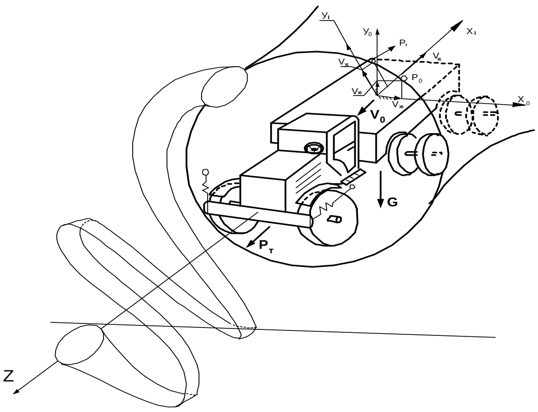

Fig. 4. The moving of energetic vehicle under the force of $\vec{P}_T$, $\vec{G}$ and initial speed $\vec{\upsilon}_0$;
$\vec{P}_T$ – the vector of gravity, $\vec{G}$ – weight power, $\vec{\upsilon}_0$ – the vector of weight power

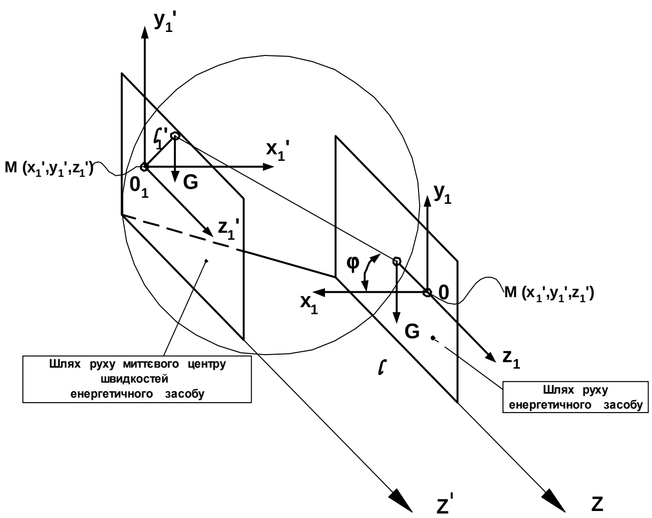

Fig. 5. Flexure of space within change of energetic vehicle work regime

In case if $\vec{P}_T$, $\vec{G}$ and vector of initial speed $\vec{\upsilon}_0$ acts directly on the plane *z*0*t* and moving of energetic vehicle would be carried out in this plane, then equation of linear even moving is valid for a description of such moving.

In change of regime of moving, so to plane *S* acts outside force (Fig. 5.), point M with coordinates x, y, z. Like in mirror *S*, will be reflected point M_1 with coordinates x'_1, y'_1, z'_1. Connection with points M and M_1 in plane $x_1 0 y_1$ and plane $x'_1 0 y'_1$. For easier description of points M and M_1 [Loycyanskiy *et. al*. 1954, Targ 1963, Yablonskiy 1971, Palko 1977, Stradjinskiy 1980], let us look up differential equations of moving only for point M, that all look like:

$$m \cdot \ddot{x} = c \cdot l \cdot \cos\varphi; \; m \cdot \ddot{y} = +c \cdot l \cdot \sin\varphi - G \tag{4}$$

where:

c – is integrity of force action,
l – distance from the beginning of coordinates *0* till M point,
φ – the corner of dislocation of *m* M.

The way of energetic vehicle moving speed rapid centre

Since

$$\cos\varphi = \frac{x}{l}; \; \sin\varphi = \frac{y}{l}$$

then

$$m \cdot \ddot{x} = c \cdot x; \quad m \cdot \ddot{y} = +c \cdot y - G \tag{5}$$

Let us divide both parts (5) to m and will get differential equation:

$$\ddot{x} - \kappa^2 \cdot x = 0 \tag{6}$$

$$\ddot{y} - \kappa^2 \cdot y = -G \tag{7}$$

where:

$$\kappa = \sqrt{\frac{c}{m}} .$$

The equations (6), (7) are liners differential equations of second-order with permanent coefficients. The equation (6) is similar, but equation (7) not similar.

THE RESULTS OF INVESTIGATIONS

The solution of equations (6) and (7) has the look:

$$x = c_1 \cdot \cos\kappa \cdot t + c_2 \cdot \sin\kappa \cdot t \tag{8}$$

$$y = c_3 \cdot \cos\kappa \cdot t + c_4 \cdot \sin\kappa \cdot t - g / \kappa^2 \tag{9}$$

The first derivative of these equations will have the look:

$$\dot{x} = -c_1 \cdot \kappa \cdot \sin \kappa \cdot t + c_2 \cdot \kappa \cdot \cos \kappa \cdot t \tag{10}$$

$$\dot{y} = -c_3 \cdot \kappa \cdot \sin \kappa \cdot t + c_4 \cdot \kappa \cdot \cos \kappa \cdot t \tag{11}$$

Continual integrations of magnitudes C_1, C_2, C_3, C_4 can be found from the initial conditions, which will be accepted conditionally as follows:

Within $t = 0$

$$x_0 = 0\,; \quad y_0 = n \tag{12}$$

$$\dot{x}_0 = m\,; \quad \dot{y}_0 = 0 \tag{13}$$

Let us place (12) and (13) to (10), (11) and we will get:

$$x_0 = c_1\,; \quad y_0 = c_3 - g / \kappa^2 \tag{14}$$

$$\dot{x}_0 = c_2 \cdot \kappa\,; \quad \dot{y}_0 = c_4 \cdot \kappa \qquad 15)$$

from (14) and (15) we have

$$c_1 = 0; \quad c_2 = \frac{m}{\kappa}; \quad c_3 = n + g / \kappa^2; \quad c_4 = 0 \tag{16}$$

Let us place (16) to (8) and (9) and we will get equation of moving at axis x and y moving:

$$x = \frac{m}{\kappa} \cdot \sin \kappa \cdot t \tag{17}$$

$$y = (n + g / \kappa^2) \cdot \cos \kappa t - g / \kappa^2 \tag{18}$$

Let us write these equations of moving in the following way:

$$\sin \kappa t = \frac{x}{m / \kappa}; \tag{19}$$

$$\cos \kappa \cdot t = \frac{y + g / \kappa^2}{n + g / \kappa^2} \tag{20}$$

Let us summarize both parts of equations (19) and (20) to square, let us sum them up and we will get equation of M point trajectory:

$$\frac{x^2}{(m / \kappa)^2} + \frac{(y + g / \kappa^2)^2}{(n + g / \kappa^2)^2} = 1 \tag{21}$$

Similar equation of moving can be obtained for M_1 point.

Points M and M_1 are jointly turning relatively to additionally rapid centre of speeds that were made by themselves and making propeller effect.

In case of looking up of points M and M_1 moving relatively to three coordinates with calculation of their speed relatively to axes we will get their joint moving in the way presented in Figure 6.

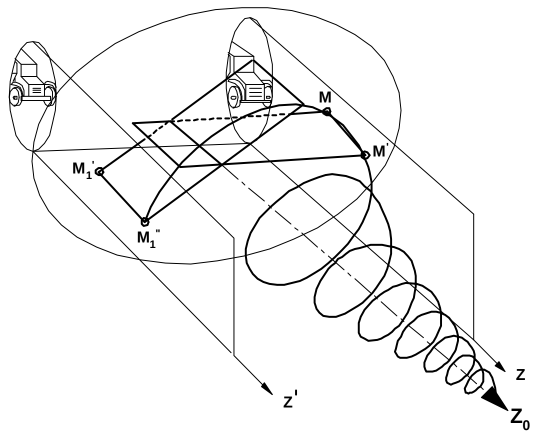

Fig. 6. The energetic vehicle (automobile) moving in special conditions within making of rapid turn axis

When in energetic vehicle's capacity will be used plane, then its moving will look like Figure 7.

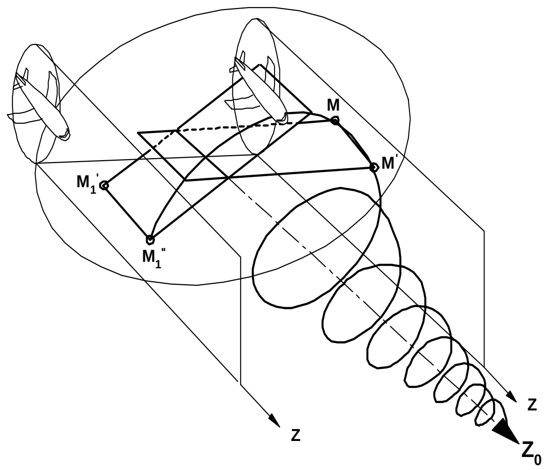

Fig. 7. The energetic vehicle (plane) moving in special conditions within making of rapid turn axis

CONCLUSIONS

1. The energetic vehicle moving in special conditions is entailed by making of rapid turn axis.
2. Within energetic vehicle moving in special conditions it is possible to raise energetic vehicle turn and rapid centre of speed near the rapid axis.
3. The rapid turn axis is an integral part of energetic vehicle moving in special conditions.
4. The adaptation of the offered theory could be accounted for technologies of vehicles driving.
5. Within the acceleration of vehicle could be accounted energy of turn square moving around rapid axis

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